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101 N. MAIN STREET
SUITE 800
ANN ARBOR, MICHIGAN 48104-1476

(734) 913-9300
FACSIMILE (734) 913-6007
jposa@patlaw.com
dwathen@patlaw.com

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TO: EXAMINER ZOILA CABRERA

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RE: SN 09/671,536

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Applicant(s): Alexander

Docket No.

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Serial No.

09/671,536

Filing Date

Sept. 27, 2000

Examiner

Z. Cabrera

Group Art Unit

2121

Invention: **MULTI-MATERIAL TOOLPATH GENERATION FOR DIRECT METAL DEPOSITION**

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Response to Office Action

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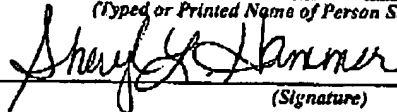
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OFFICIAL

In re application of: Alexander

Serial No.: 09/671,536

Group No.: 2121

Filed: Sept. 27, 2000

Examiner: Z. Cabrera

For: MULTI-MATERIAL TOOLPATH GENERATION FOR DIRECT METAL DEPOSITION

RESPONSE TO OFFICE ACTIONCommissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action mailed February 12, 2004, the claims of this application are being resubmitted in unamended form on the grounds that the Examiner has failed to establish *prima facie* obviousness and, in the opinion of Applicant, has mischaracterized the prior art.

The Examiner states on page 2 of the Office Action that Rock ('481) discloses the step of "separating modeling each material as a single or multiple solid part under the assumption *that multiple materials or voids are not present*" (referencing Fig 4; column 7, lines 14-26, and Col. 5, lines 65-67). However, the undersigned has carefully perused these sections of Rock, and cannot find support for the Examiner's argument. In particular, Figure 4 of Rock simply shows cross-sections of a component plotting material composition, but says nothing about separately modeling each material as a single or multiple solid part under the assumption that multiple materials or voids are not present. Likewise, column 7, lines 14-26 describe how the processes controlled by a computer using three-dimensional solid model information defining the geometry and other attributes such as material composition. Although a computer must be programmed to take process deformations into account, such as those induced by compaction, again, this portion of the '481 patent is silent as to separately modeling each material as a single or multiple solid part under the assumption that multiple materials or voids are not present. Finally, column 5, lines 65-67 simply state that "[t]he shape of the first class material is dictated by its boundary with other materials including second class material 2." Not only does this portion of the '481 patent fail to render the subject claims obvious, it seems to Applicant that the

GIFFORD, KRASS, GROH, SPRINKLE, ANDERSON & CITKOWSKI, P.C., 280 N. OLD WOODWARD AVENUE, STE. 400, BIRMINGHAM, MICHIGAN 48009-5394 (248) 647-6000

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method of Rock clearly attempts to separately model each material under the assumption that multiple materials are present.

The Examiner further contends that Rock discloses ordering the parts from the outermost geometry to the innermost geometry, referring to Figure 3, stating that "the first layer corresponds to the outermost geometry and subsequent layer correspond to the innermost geometry." This is clearly a mischaracterization, since once the part is completed, won't the final "innermost" layer actually become one of the "outermost" surfaces? According to Applicant's invention, outermost and innermost use definitions which are not repugnant to standard definitions; namely, from the outside surfaces of the part toward to the central portion of the component.

With regard to claims 2, 3 and 5, the Examiner states that Rock further discloses that all of the steps are carried out using a CAD system limited to single-material designs, referencing column 9, lines 14-17 and 40-42. However, column 9, lines 14-17 state "[a]n alternative material deposition subsystem is shown in FIG. 9. In lieu of a single deposition effector, a deposition array 44 is used to deposit first class material and/or second class material at more than one point location at a time along the surface to be deposited thereupon" (emphasis added). Given that first and second class materials may clearly be considered in one embodiment, Applicant disagrees that claim 2 reads on the Rock reference. Indeed, column 9, lines 40-42 state that "the deposition effector translation approach described here and shown in FIG. 8 is not limited to a single deposition effector" (emphasis added).

The Examiner goes on to state that Rock discloses that the tool path may be a spiral-in or spiral-out, arbitrary direction raster path, or a combination thereof, again referencing column 9, lines 14-17. However, although a deposition array 44 is used for deposition, Applicant cannot find any reference to spiral-in, spiral-out or arbitrary raster path modalities. With respect to claim 5, the Examiner states that Figure 5 of Rock discloses the step of "embedding commands as appropriate to accommodate closed- or open-loop control over the fabrication process." However, Figure 5 is simply a flowchart showing the way in which CAD geometries are transformed into a 3-D model, sliced and delivered as commands to hardware which realizes a part. Where, Applicant asks, is there a reference to figure to closed- or open-loop control over the fabrication process?

It is well settled that in order to render a claim obvious the Examiner must provide a reason why one having ordinary skill in the pertinent art would have been led to combine the cited references to

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arrive at Applicant's claimed invention. There must be something *in the prior art* that suggests the proposed combination, other than the hindsight gained from knowledge that the inventor choose to combine these particular things in this particular way. Uniroyal Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988). The Examiner is also required to make specific findings on a suggestion to combine prior-art references. In Re Dembeczak, 175 F.3d 994, 1000-01, 50 USPQ2d 1614, 1617-19 (Fed. Cir. 1999).

In this case, the Examiner concedes that Rock does not disclose performing Boolean operations, but relies upon Hanratty ('897) for that disclosure, arguing that "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Rock with Hanratty because it would provide with [sic] a simple system for modeling a three-dimensional object by using well known Boolean operations for realizing the volume of a part as taught by Hanratty (Col. 1, lines 35-50)." This argument is flawed on several grounds. First, it appears to Applicant *has no use* for any form of Boolean operations, but rather, is self-operative in terms of all of the processes used to create a finished part. Reference is made to Figure 5 of Rock in particular, and the associated text, wherein all operations are accounted for without the need for Boolean operations. There is no teaching or suggestion whatsoever in Rock as to the need for a simple system for modeling a three-dimensional object, since Rock already takes care of such procedures using different methods. Nor, is there in Hanratty, are there any teachings or suggestions to combine the features of the '897 patent with that of the '421 patent. Accordingly, *prima facie* obviousness has not been established.

Claim 4 stands rejected under 35 U.S.C. §103(a) over Rock in view of Hanratty, and further in view of Mazumder ('105), and claim 6 stands rejected under 35 U.S.C. §1039a) over Rock in view of Hanratty, and further in view of Hanna et al. ('523). However, given the argument above as to the misinterpretation of Rock, and the lack of support *from the prior art* in motivating the combination of Rock and Hanratty, Applicant contends that claims 4 and 6 are allowable as well, since no further argument can be made that the combination of references is justified.

Based upon the foregoing comments, Applicant believes all claims are in condition for allowance. Questions regarding this application may be directed to the undersigned attorney at the telephone/facsimile numbers provided.

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Respectfully submitted,

By: 

John C. Posa

Reg. No. 37,424

Gifford, Krass, Groh, Sprinkle,
Anderson & Citkowski, PC

280 N. Old Woodward Ave., Ste 400

Birmingham, MI 48009

(734) 913-9300 FAX (734) 913-6007

Dated: May 12, 2004

GIFFORD, KRASS, GROH, SPRINKLE, ANDERSON & CITKOWSKI, P.C. 280 N. OLD WOODWARD AVENUE, STE. 400, BIRMINGHAM, MICHIGAN 48009-5394 (248) 647-6000